No. of Pages. 16

Code No.	Y – 3071

Register Number :

Name :

Time : 2 Hours

Max.Marks : 100

Entrance Examination for Admission to Four Year Under Graduate Programmes in the Teaching Departments, 2026

CSS

CHEMISTRY

GENERAL INSTRUCTIONS

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be marked **only** in the "**OMR Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

INSTRUCTIONS FOR FILLING THE OMR SHEET

- The OMR sheet should not be folded or crushed.
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not leave any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.
- WRONG METHODS

CORRECT METHOD

DO NOT WRITE HERE

Choose appropriate answer from the options in the questions.

(100 × 1 = 100 marks)

1. Which of the following laws is obeyed by a balanced chemical equation?
   A. Law of conservation of mass
   B. Ohm's law
   C. Boyle's law
   D. Newton's law

2. The percentage of hydrogen in water is
   A. 11.11%
   B. 22.22%
   C. 88.89%
   D. 50%

3. Which of the following concentration terms does NOT depend on temperature?
   A. Molarity
   B. Molality
   C. Normality
   D. Volume %

4. Which of the following is a displacement reaction?

   A. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

   B. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

   C. $HCl + NaOH \rightarrow NaCl + H_2O$

   D. $N_2 + H_2 \rightarrow NH_3$

5. How many grams of $CaCO_3$ (Molar mass = 100 g/mol) are needed to produce 22 g CO_2? $CaCO_3 \rightarrow CaO + CO_2$

   A. 25 g
   B. 100 g
   C. 75 g
   D. 50 g

6. Which of the following is true about Isotopes?

   A. They have same mass number

   B. They have same number of shells

   C. They have same number of neutrons

   D. They have same atomic number

7. According to Pauli's exclusion principle, an orbital can hold maximum :

   A. 1 electron
   B. 8 electrons
   C. 4 electrons
   D. 2 electrons

8. Which of the following pairs are isobars?

   A. ${}_6C^{12}$ and ${}_6C^{14}$
   B. ${}_1H^{1}$ and ${}_1H^{2}$
   C. ${}_{18}Ar^{40}$ and ${}_{20}Ca^{40}$
   D. ${}_8O^{16}$ and ${}_8O^{17}$

9. According to Hund's rule, electrons occupy degenerate orbitals :

   A. In pairs first
   B. Singly first
   C. Randomly
   D. Singly with parallel spins first

10. Which of the following statements explains the limitations of Rutherford's model?

    A. Could not explain the nucleus

    B. Could not explain the stability of atom

    C. Could not explain electrons

    D. Could not explain protons

11. For n = 3 shell, the number of subshells possible is :

A. 1 B. 2

C. 3 D. 4

12. Which property of liquid causes the formation of spherical droplets?

A. Viscosity B. Vapour pressure

C. Surface tension D. Density

13. Which intermolecular force exists between non-polar molecules?

A. Hydrogen bonding B. Ion-dipole force

C. London dispersion force D. Covalent bond

14. According to Graham's law, rate of diffusion is inversely proportional to the square root of :

A. Pressure B. Temperature

C. Density or molar mass D. Volume

15. The pressure exerted by 2 moles of an ideal gas in a 10 L vessel at 300 K ($R = 0.0821$ L atm mol^{-1} K^{-1}) is :

A. 2.46 atm B. 4.92 atm

C. 6.15 atm D. 8.21 atm

16. If the temperature of a gas is doubled, the rms velocity becomes :

A. Doubled B. Half

C. $\sqrt{2}$ times D. Four times

17. According to the modern periodic law, the properties of elements are periodic functions of their :

A. Atomic mass B. Atomic number

C. Mass number D. Density

18. Which of the following species has the largest ionic radius?

A. Na^+ B. Mg^{2+}

C. F^- D. O^{2-}

19. Which isotope of hydrogen contains no neutrons?

A. Deuterium B. Tritium

C. Protium D. Hydronium

20. Which alkali metal reacts most vigorously with water?

A. Lithium
B. Sodium
C. Potassium
D. Caesium

21. Which of the following statements is true about hydrogen peroxide?

A. It can act as a reducing agent only
B. It can act as an oxidising agent only
C. It can act as an oxidising as well as a reducing agent
D. It can act as a catalyst only

22. Lithium shows anomalous behaviour due to

A. Large size
B. High reactivity
C. Small size and high polarising power
D. Presence of d-orbitals

23. Which of the following compounds is used in the Solvay process for the manufacture of washing soda?

A. NaOH
B. $NaHCO_3$
C. NaClO
D. Na_2SO_4

24. On heating the gypsum to 393 K, the product formed is :

A. $CaSO_4 \cdot 2H_2O$
B. $CaSO_4 \cdot \frac{1}{2} H_2O$
C. $CaCO_3$
D. CaO

25. Brass is an alloy of :

A. Copper and zinc
B. Copper and tin
C. Iron and carbon
D. Lead and tin

26. The common oxidation state of lanthanoids is :

A. +1
B. +2
C. +3
D. +6

27. Which of the following acts as a catalyst in the hydrogenation of oils?

A. Nickel
B. Zinc
C. Sodium
D. Copper

28. The oxidation state of chromium in $Cr_2O_7^{2-}$ is :

A. +3 B. +4

C. +6 D. +7

29. Boron differs from other Group 13 elements because it :

A. Is non-metallic in nature B. Forms only ionic compounds

C. Has larger atomic size D. Has d-orbitals

30. Which of the following molecules has a linear shape?

A. CO_2 B. H_2O

C. NH_3 D. SO_2

31. The hybridisation of boron in BF_3 is :

A. sp^2 B. sp

C. sp^3 D. dsp^2

32. Which of the following is a polar molecule?

A. CO_2 B. BF_3

C. H_2O D. CCl_4

33. Which of the following is an intensive property?

A. Mass B. Volume

C. Temperature D. Number of moles

34. A thermodynamic property whose value depends only on initial and final states is called :

A. Path function B. State function

C. Intensive function D. Mechanical function

35. Which of the following processes has a positive enthalpy change?

A. Freezing of water B. Condensation of steam

C. Melting of ice D. Neutralisation reaction

36. For a spontaneous process at constant temperature and pressure, ΔG is :

A. Positive B. Zero

C. Negative D. Infinite

37. In a thermodynamic process, if the change in internal energy is 100 J and the work done by the system is 40 J, the heat absorbed is :

A. 60 J
B. 100 J
C. 140 J
D. –60 J

38. Which of the following is the correct condition for a process to occur under adiabatic condition?

A. $\Delta T = 0$
B. $\Delta U = 0$
C. $q = 0$
D. $w = 0$

39. According to the law of mass action, the rate of a reaction is proportional to the :

A. Temperature only
B. Active masses of reactants
C. Pressure only
D. Volume only

40. According to Bronsted-Lowry concept, an acid is a :

A. Proton acceptor
B. Electron donor
C. Proton donor
D. Electron pair acceptor

41. For a reversible reaction, if the reaction quotient is less than the equilibrium constant ($Q_c < K_c$), the reaction will proceed in :

A. Backward direction
B. Forward direction
C. No reaction
D. Both directions equally

42. Which of the following salts, on hydrolysis, gives an acidic solution?

A. NaCl
B. CH_3COONa
C. NH_4Cl
D. KNO_3

43. Which of the following is an example of a redox reaction?

A. $HCl + NaOH \rightarrow NaCl + H_2O$
B. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
C. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$
D. $CaCO_3 \rightarrow CaO + CO_2$

44. In $KMnO_4$, the oxidation number of Mn is :

A. +2
B. +4
C. +6
D. +7

45. Kohlrausch's law is used to determine :

A. Atomic mass
B. Limiting molar conductivity
C. Vapour pressure
D. Specific conductance

46. How much charge, in terms of Faraday, is required to produce 20 grams of Calcium from molten Calcium chloride by electrolysis?

A. 1 Faraday
B. 2 Faraday
C. 0.5 Faraday
D. 20 Faraday

47. According to Nernst equation, electrode potential depends on :

A. Temperature and ion concentration
B. Temperature only
C. Volume and Pressure
D. Ion concentration only

48. Molecularity of an elementary reaction is always :

A. Zero
B. Fractional
C. Whole number
D. Negative

49. Which of the following statements is true for a zero-order reaction?

A. The rate is directly proportional to concentration
B. The rate is independent of concentration
C. The rate is inversely proportional to concentration
D. The rate is proportional to the square of concentration

50. Which graph gives a straight line for a first-order reaction?

A. [A] vs t
B. 1/[A] vs t
C. log[A] vs t
D. Rate vs $[A]^2$

51. In heterogeneous catalysis, the catalyst and reactants are in :

A. Same phase
B. Different phases
C. Liquid phase only
D. Gas phase only

52. During a chemical reaction, when the temperature increases, the rate constant generally increases because :

A. Activation energy increases

B. More molecules cross the activation energy barrier

C. Catalyst is formed

D. Order of reaction changes

53. The coordination number of a body-centered cubic (bcc) lattice is :

A. 4 B. 6

C. 8 D. 12

54. Schottky defect is due to :

A. Extra ions in the lattice

B. Missing equal number of cations and anions

C. Electron trapped in the vacancy

D. Misplaced atoms only

55. According to Raoult's law, the vapour pressure of a solution is proportional to the :

A. Mole fraction of solute B. Mole fraction of solvent

C. Density of solvent D. Mass of solute

56. When a non-volatile solute is added to a solvent, which of the following effects is observed?

A. Increase in vapour pressure B. Decrease in boiling point

C. Elevation in boiling point D. Increase in freezing point

57. Van't Hoff factor is used to account for :

A. Temperature change

B. Pressure change

C. Density of solution

D. Deviation due to association or dissociation of solute

58. Which type of adsorption involves weak van der Waals forces?

A. Chemisorption B. Absorption

C. Catalysis D. Physisorption

59. Milk is an example of :

A. Aerosol
B. Foam
C. Sol
D. Emulsion

60. The Tyndall effect shown by colloids is due to :

A. Reflection of light by colloidal particles
B. Refraction of light by colloidal particles
C. Absorption of light by solvent molecules
D. Scattering of light by colloidal particles

61. According to Freundlich adsorption isotherm, the amount of substance adsorbed per unit mass of adsorbent :

A. Is independent of pressure
B. Increases with an increase in pressure
C. Decreases with an increase in pressure
D. None of the above

62. The formula of the coordination compound Tetraammineaquachloridocobalt (III) chloride is :

A. $[Co(NH_3)_4(H_2O)Cl]Cl_2$
B. $[Co(NH_3)_4Cl_2]H_2O$
C. $[Co(NH_3)_4(H_2O)Cl_2)Cl$
D. $[Co(NH_3)_4(H_2O)_2]Cl_3$

63. In the spectrochemical series, the strongest field ligand among the following is :

A. I^-
B. H_2O
C. NH_3
D. CN^-

64. Which type of isomerism is shown by ($[Pt(NH_3)_2Cl_2]$)?

A. Cis-trans isomerism
B. Optical isomerism
C. Chain isomerism
D. Functional isomerism

65. The colour of many transition metal complexes is due to :

A. d-d electronic transitions
B. Nuclear transitions
C. Proton transfer
D. Ionisation of ligands

66. Which of the following pairs shows ionization isomerism?

A. $([Co(NH_3)_5Br]SO_4)$ and $([Co(NH_3)_5SO_4]Br)$

B. cis-$([Pt(NH_3)_2Cl_2])$ and trans-$([Pt(NH_3)_2Cl_2])$

C. $([Ni(CO)_4])$ and $([Fe(CO)_5])$

D. $([Cu(NH_3)_4]SO_4)$ and $([Zn(NH_3)_4]SO_4)$

67. During the extraction of iron in the blast furnace, which of the following acts as the main reducing agent?

A. Carbon monoxide B. Carbon dioxide

C. Oxygen D. Limestone

68. Which of the following processes is used for the extraction of gold and silver?

A. Hall process B. Cyanide process

C. Bessemer process D. Zone refining

69. Which of the following cations forms a white precipitate with dilute HCl?

A. Fe^{3+} B. Ag^{+}

C. Zn^{2+} D. Ca^{2+}

70. Which of the following statements about $BaSO_4$ is correct?

A. $BaSO_4$ is soluble in water

B. $BaSO_4$ is a yellow-coloured precipitate

C. $BaSO_4$ forms a blue-coloured solution in water

D. $BaSO_4$ is insoluble in water

71. Which of the following gases is mainly responsible for acid rain?

A. Oxygen B. Sulphur dioxide

C. Nitrogen D. Carbon dioxide

72. A sigma (σ) bond is formed by :

A. Electron transfer B. Sidewise overlap

C. Head-on overlap D. Ionic attraction

73. The shape of ethene (C_2H_4) around each carbon atom is :

A. Linear B. Tetrahedral

C. Trigonal planar D. Octahedral

74. Which of the following phenomena is exhibited by the compound But-2-ene?

A. Optical isomerism
B. Geometrical isomerism
C. Tautomerism
D. Functional isomerism

75. Which of the following effects causes electron displacement through sigma bonds?

A. Resonance effect
B. Inductive effect
C. Hyperconjugation
D. Electromeric effect

76. Which of the following molecules can show optical isomerism?

A. CH_4
B. CH_3CH_2OH
C. $CH_3CHBrCl$
D. $CH_2 = CH_2$

77. The IUPAC name of the compound CH_3COOH is :

A. Methanoic acid
B. Ethanoic acid
C. Propanoic acid
D. Acetic Acid

78. Which of the following is a meso compound?

A. Molecule with one chiral carbon
B. Achiral compound with two chiral centres and plane of symmetry
C. Compound with no chiral centres
D. Racemic mixture

79. A hydrocarbon on combustion gives 8.8 g CO_2 and 3.6 g H_2O. Empirical formula of the compound is :

A. CH
B. CH_2
C. CH_4
D. C_2H_4

80. Members of a homologous series differ by :

A. CH_2 group
B. CH_3 group
C. OH group
D. CH_4 group

81. Ethene is converted to ethanol by :

A. Hydrogenation
B. Acid-catalysed hydration
C. Halogenation
D. Ozonolysis

82. Which of the following functional groups is present in phenol?

A. –CHO
B. –OH
C. –COOH
D. $–NH_2$

83. In Newman projection of ethane, the most stable conformation is :

A. Eclipsed
B. Gauche
C. Staggered
D. Boat

84. Addition of HBr to propene in presence of peroxide gives :

A. 1-Bromopropane
B. 2-Bromopropane
C. Propanol
D. Bromobenzene

85. Phenol on treatment with chloroform and NaOH gives salicylaldehyde. This reaction is called :

A. Reimer-Tiemann reaction
B. Kolbe reaction
C. Friedel-Crafts reaction
D. Cannizzaro reaction

86. Which type of reaction is most commonly shown by benzene?

A. Addition reactions
B. Electrophilic substitution reactions
C. Elimination reactions
D. Neutralisation reactions

87. In toluene, nitration occurs mainly at ortho and para positions. Which of the following is the correct explanation of this?

A. The $-CH_3$ group is deactivating and meta-directing
B. Toluene is an aromatic compound
C. The $-CH_3$ is a neutral group
D. The $-CH_3$ group is activating the ortho-para position

88. Grignard reagent has the general formula :

A. RCOOH
B. RX_2
C. RNH_2
D. RMgX

89. Williamson synthesis is used for preparation of :

A. Aldehydes
B. Ketones
C. Amines
D. Ethers

90. Which reagent gives silver mirror test with aldehydes?

A. Fehling's solution
B. NaOH
C. $KMnO_4$ only
D. Tollens' reagent

91. Hinsberg test is used to distinguish :

A. Alcohols
B. Aldehydes
C. Ethers
D. Amines

92. Which of the following compounds gives a ketone on oxidation?

A. Primary alcohol
B. Tertiary alcohol
C. Phenol
D. Secondary alcohol

93. Which of the following compounds gives a diazonium salt on reaction with nitrous acid at 0-5°C?

A. Aliphatic amines only
B. Aniline
C. Tertiary amines
D. Nitrobenzene

94. Reaction of CH_3MgBr with formaldehyde followed by hydrolysis gives :

A. Ethanol
B. Methanol
C. Propanol
D. Ethanal

95. Chlorobenzene is less reactive towards nucleophilic substitution than chloromethane because :

A. C–Cl bond in chlorobenzene has partial double bond character
B. Chlorobenzene is ionic
C. Chlorobenzene contains more hydrogen atoms than chloromethane
D. Benzene ring repels chlorine completely

96. Glucose is classified as a :

A. Disaccharide
B. Monosaccharide
C. Polysaccharide
D. Protein

97. The linkage joining amino acids in proteins is called :

A. Glycosidic bond
B. Peptide bond
C. Hydrogen bond
D. Ester bond

98. Which of the following is an example of an addition polymer?

A. Dacron/terylene
B. Bakelite
C. Nylon 6,6
D. Teflon

99. Drugs used to neutralise excess stomach acid are called :

A. Analgesic
B. Antibiotics
C. Antacids
D. Tranquilizers

100. The cleansing action of soap is due to the formation of :

A. Crystals
B. Precipitates
C. Micelles
D. Emulsions only

ROUGH WORK

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